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# **The Critical Thinking Course at Fayetteville State: A Pilot Study**

by

Akbar Aghajanian  
Gregory Rich  
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## **Introduction**

Fayetteville State University (FSU), a historically black college founded in 1867 with the primary purpose of training teachers, became a constituent part of the University of North Carolina system in 1972. Between 1987 and 1993, the school underwent a dramatic demographic transition. Enrollment increased by 53%, from 2,639 to 4,032. Black enrollment increased by one-third, and white enrollment doubled. The average Scholastic Aptitude Test (SAT) score for entering classes rose by 200 points.

During this period the curriculum also underwent revision, including the addition of a critical thinking course required of all freshmen. This paper focuses on the grounds for instituting the course and the data regarding the course's effectiveness.

A Nation at Risk, the 1984 study done by the National Commission on Excellence in Education, concluded that U.S. college-age students were not reasoning as well as they should be. The study noted that

"many 17-year-olds do not possess the 'higher' order' intellectual skills we should expect of them. Nearly 40 percent cannot draw inferences from written material; only one-fifth can write a persuasive essay; and only one-third can solve a mathematics problem requiring several steps" (9).

At the same time, other studies emphasized the importance of critical thinking skills. According to "The Information Society," a 1982 brochure published by the Education Commission of the States, "The basics' of tomorrow are the skills considered to be of a higher level today. These skills include: evaluation and analysis skills, critical thinking, problem-solving strategies, ..." (23). And according to Academic Preparation for College, a 1983 College Board booklet, reasoning is a basic academic competency needed for college-level work (9-10). In 1989 the National

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Education Goals Panel put forward as one of its objectives that "The proportion of college graduates who demonstrate an advanced ability to think critically, communicate effectively, and solve problems will increase substantially" (National Education Goals Report 237, 1991). Goal 5 of the Panel's Report described these skills as "necessary to compete in a global economy and exercise the rights and responsibilities of citizenship" (qtd. in Halpern 24, 1994).

Empirical evidence suggested that college would not do much to remedy the deficiencies that had been cited in A Nation at Risk. Joanne Kurfiss, in a 1988 ASHE-ERIC Higher Education Report, "Critical Thinking: Theory, Research, Practice, and Possibilities," cited a half-dozen studies indicating that a college education was having a limited influence on reasoning skills (1). Kurfiss pointed out that while seniors have a greater awareness of evidence than do freshmen, seniors "still believe judgment is a matter of individual idiosyncrasies" (1).

Convinced of the importance of critical thinking, many educators, including some at Fayetteville State University, began advocating changes in the curriculum, changes that would help students become critical thinkers. Critical thinkers are persons willing and able to assess claims and arguments according to such criteria as precision, accuracy, consistency, relevance, proper inference, and plausibility and adequacy of evidence. Such thinkers seek out the reasons for and against beliefs, try to determine the relative weights of these reasons, and then apportion their beliefs and actions to the evidence.

Stephen Norris and Robert Ennis, leaders in the critical thinking movement in the United States, define 'critical thinking' as "reasonable and reflective thinking that is focused upon deciding what to believe or do" (1, 1989). Teaching students to think critically benefits the students and our society. First, it helps promote a healthy democracy (Cf. Siegel 60, 1988). If citizens are unable to think critically, they are less likely to make the best political decisions. Demagogic rule is more likely if there is no general habit of rationally considering the reasons offered for and against various political policies -- if people primarily make decisions based on feeling instead of reason. As Thomas Jefferson said, "In a republican nation, whose citizens are to be led by reason and persuasion, and not by force, the art of reasoning becomes of the first importance" (qtd. in Copi and Cohen v, 1994).

Teaching students to think critically also helps to prepare them for success in life. Critical thinking skills, along with other cognitive skills and interpersonal skills, make up competency and success in the workplace, in the world after graduation (Pottinger 39, 1977). In today's fast changing world, students who just learn a body of quickly out-of-date facts will not have learned all they need for success. Learning the processes of solving problems will better prepare students for the new, unforeseeable situations they will face in every day life. Learning to look carefully at the reasons for and against believing or doing certain things can protect students from costly mistakes as well. Whether they are trying to decide which career to pursue or which house to buy, critical thinking can help them make the best decision. Therefore, not only does critical thinking help promote a healthy democracy, it also helps promote successful living.

But should there be a separate course in critical thinking at the college level? Some educators favor infusing critical thinking throughout the curriculum instead of having a separate course in it. But even if practitioners in other subject areas are willing to infuse critical thinking into their courses, there remain several reasons for having a separate course. First, the time and focus provided by a separate course make it easier to develop critical thinking skills. If we try to teach it only in subject-specific courses, there is a serious risk that the students' attention will be unduly divided between the subject content of the courses and the general thinking skills the courses aim to promote. Second, post-graduate exams, such as the Law School Admissions Test (LSAT), the Graduate Management Admissions Test (GMAT), and the Medical College Admissions Test (MCAT), include sections testing reasoning skills. Other exams such as the PRAXIS Series Tests: Professional Assessments for Beginning Teachers, also require students to marshal evidence and consider objections, key areas of concern in critical thinking courses. In fact, few courses focus as much on the types of reasoning-questions asked on such exams as critical thinking courses. As long as these exams include these reasoning sections, there is a need for a separate course in critical thinking to help prepare students for these exams. Finally, like writing and math, critical thinking is used in so many different areas that it merits a separate course. Teaching critical thinking in a separate course as well as infusing critical thinking throughout the curriculum seems to be the optimal approach for developing critical thinking skills.

Convinced of the need for a separate course in critical thinking, administrators and faculty at numerous colleges and universities have included a freshman course in critical thinking in their general education curriculum. Fayetteville State University and LaGuardia Community College of the City University of New York are among these schools. They, like the schools in the California university system, have Critical Thinking as a general education requirement (Moore 1983).

Philosophy 110, Critical Thinking, was instituted at Fayetteville State University in the fall of 1989. All students entering Fayetteville State University with under fifty-seven credit hours are required to take this three credit hour general education course.

The syllabus for the course states that the purpose of the course is to introduce the students to the basic elements of argumentation. The course aims to help students develop their skills in analyzing, evaluating, and developing arguments as they appear in various fields and in everyday life. The course covers such topics as non-argumentative persuasion, argument recognition, identification of premises and conclusion, informal fallacies, ambiguity and vagueness, identification and assessment of inferential relationships, techniques for assessing the reasonableness of claims, general criteria for determining a credible source, arguments by analogy and their criteria of adequacy, inductive generalizations and the fallacies associated with them, and methods of evaluating causal claims, such as 'Saccharine causes cancer.' There is expert consensus that these topics are suitable for a critical thinking course (Cf. Facione 1990).

The course syllabus assigns behavioral objectives for each assignment and includes a promise that all test items will be derived from these objectives. In effect, then, the syllabus includes a semester-long study guide. The syllabus also provides step-by-step directions for writing



argumentative essays and correlates textbook material with three computer-assisted-instruction packages that are available for student use in campus computer labs.

A major pedagogical assumption in the course is that people learn by doing or by practicing. Consequently, students have homework almost every night. Besides doing homework exercises, students write four evaluative/argumentative essays in the course and take five exams including the post-test.

Many who teach the course have a background in philosophy, but some from other areas who have a special interest in critical thinking and special aptitude for it also teach the course. The course is labor intensive for teachers, because they agree to grade approximately 50% of the homework assignments.

Do students who take the course improve their critical thinking skills? This paper addresses this question based on data collected from students who took this course at Fayetteville State University during the 1990-1992 academic years.

## **Data and Method**

This study uses data collected from 2,126 students who took the critical thinking course during the 1990-1992 academic years. The data were collected by means of a pre-test and post-test strategy. An alternate form of the same instrument was used for both pre-test and post-test. Before students register for courses at FSU, they take the pre-test as part of their profile-entrance tests. Then when they enroll in Critical Thinking, they take the post-test during the last few weeks of the course. The maximum attainable score on the test instrument is 30. To encourage students to take the post-test seriously, their score on it counts five percent of their semester grade.

The pre-test/post-test used is based on one that accompanies the popular critical thinking text by Brooke Moore and Richard Parker, Critical Thinking. The Moore and Parker pre-test/post-test that appears at the end of their instructor's manual has, however, been developed further and made entirely multiple-choice, and it is this developed test that is our pre-test/post-test.<sup>1</sup>

Using a pre-test/post-test strategy to determine course effectiveness obviously requires a valid means of measuring critical thinking skills. When we began collecting data for this study, we did not have access to an "externally validated test," such as the Cornell Critical Thinking Test - Level Z. Such a test has been checked at a variety of test sites, and there is a consensus among experts that it reliably measures critical thinking skills.

While our pre-test/post-test is not an externally validated test, we attempted to check the validity of our test by finding out the correlation between verbal SAT score and Critical Thinking pre-test score.<sup>2</sup> The correlation between verbal SAT score and pre-test score was .36, a high correlation. This correlation is statistically significant at .001. That means that there is a greater than 99%

probability that the outcome was not due to chance. Moreover, in a 1994 internal review of the course, a committee of five, including four Ph.D.'s in philosophy and one Ph.D. in Humanities, compared the pre-test/post-test used in our course with the Cornell Level Z Test and the California Critical Thinking Skills Test and reached consensus that the pre-test/post-test used here was a more appropriate measure of the critical thinking skills our course attempts to foster. Thus there is some reason to believe that our pre-test/post-test instrument reliably measures critical thinking skills even though our test has only been used at Fayetteville State University.

Our study compares the group that took the course with itself prior to taking the course. It would be methodologically better if our study could compare the group taking the course with another group, essentially like it but not taking the course. Scheduling difficulties have prevented this methodological improvement. While it is true that changes from pre-test scores to post-test scores could be due in part to other courses or even activities in daily life, we are confident that improvements from pre-test scores to post-test scores are related to our course because our course focuses more on the topics covered by the post-test than other courses or daily life do. However, we will attempt to control for "other factors" in possible future studies of the course's effectiveness.

Another possible problem for our study is that the rate of student participation on the post-test is lower than the rate of student participation on the pre-test. To make sure that our results were not skewed due to the lower rate of participation on the post-test, we examined demographic and academic characteristics of the pre-test group and the post-test group. Table 1 shows very minor differences between the pre-test group and the post-test group. Thus the lower rate of participation on the post-test does not bias our results.

**TABLE 1****Characteristics of Students Who Participated in Both  
the Critical Thinking Pre-test and the Post-test**

	<u>Pre-Test</u>	<u>Post-Test</u>
<u>Race</u>		
	Percent	
Black	73.9	77.9
White	22.1	18.3
Others	4.0	3.8
<u>Gender</u>		
Male	42.0	41.0
Female	58.0	59.0
<u>High School GPA</u>		
Mean	2.77	2.81
Median	2.71	2.71
<u>SAT Score</u>		
Mean	769	768
Median	730	730

**Findings**

Table 2 shows the distribution of pre-test and post-test scores for all students, within the group of 2,126, who took both the pre-test and the post-test. Almost 44 percent of the students scored one-third or less than one-third of the possible attainable score of 30 on the pre-test, i.e., made 10 or below on the pre-test. Only about 2 percent of pre-test scores were 20 and above. About 55 percent of students scored between 11 and 19.

**TABLE 2**  
**Distribution of Student Scores on the**  
**Pre-test and the Post-test in Critical Thinking**

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Scores	Pre-Test (Percent)	Post-Test (Percent)
10 and Below	43.5	20.2
11	10.2	7.8
12	10.0	8.7
13	8.9	9.4
14	7.2	8.7
15	6.1	8.2
16	4.4	7.2
17	3.9	6.9
18	2.4	5.3
19	1.5	5.5
20 and More	1.8	12.1
Total	100.0	100.0
Mean Score	11.3	14.2
Median	11	14

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The distribution of the post-test scores is markedly different from the distribution of scores on the pre-test. The percentage of the scores 10 and below declined from 44 percent to about 20 percent. The percentage of the scores 20 and above increased from 1.8 percent to 12 percent. The percentage of scores between 11 and 19 increased from 55 percent to 68 percent. This comparison of the pre-test score distribution and post-test score distribution shows a general shift from a skewed distribution toward lower scores on the pre-test to a distribution with a large number of students in the middle range scores on the post-test. From pre-test to post-test the median score changes from 11 to 14, a 27% increase. Such a shift in the distribution of scores indicates improvement in critical thinking skills for the students who complete the critical thinking course. On average, the improvement in the scores is about 2.9 points. Thus there is some evidence that the course is effective.

But do sub-groups, such as low scorers on the pre-test and high scorers on the pre-test, benefit



equally from the course? Table 3 shows the differences between pre-test scores and post-test scores for three groups: those with low scores on the pre-test (0 - 9), those with mid-range scores on the pre-test (10 - 14), and those with high scores on the pre-test (15 or above). Important differences exist among these groups in regard to the points gained on the post-test. The gain in post-test score is highest for the students who scored lowest on the pre-test. Thus, there is evidence that the students who did worst on the pre-test gained most from the critical thinking course.

**TABLE 3**

**Difference Between Pre-test Scores and Post-test Scores for Students with Low Scores on the Pre-test, Students with Mid-range Scores on the Pre-test, Students with High Scores on the Pre-test, and All Students**

<u>Pre-test Score</u>	<u>Increase from Pre-test score to post-test score</u>
9 and Below	4.5
10-14	2.6
15 and Above	2.3
All	2.9

### **Discussion and Conclusion**

Critical thinking is an important course for developing skills needed in other courses and in daily life. The course helps develop skills needed for success in life and also helps promote a healthy democracy. In this study we analyzed data from 2,126 students to explore some of the issues related to the effectiveness of the course. We have strong evidence to support the need for the course. About 44 percent of the students obtain a score of one-third or less than one-third of the possible score on the critical thinking pre-test. Studies cited indicate that many students come to college without well-developed critical thinking skills and that other college courses are not sufficiently promoting these skills. Hence, it is reasonable to offer at least one course in critical thinking to address this need.

We also have some evidence that students improve their skills in critical thinking by going through the course offered at Fayetteville State University. There is an important change in the distribution of scores from the low end of the spectrum on the pre-test to the mid-range of the spectrum on the post-test. From pre-test to post-test the median score changes from 11 to 14, a 27% increase. But not every sub-group of students benefits equally from the course: post-test gains are highest for those who scored lowest on the pre-test. So not only is there reason to believe that the course is beneficial to students, there is also reason to believe that the course is most beneficial to those who need it most.<sup>3</sup>

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<sup>1</sup> Don Fawkes, a philosophy faculty member at Fayetteville State University, made the further developments on the Moore and Parker test.

<sup>2</sup> The point about external validity was raised by John Hoaglund, Director of the Center for Critical Thinking at Christopher Newport College, in a discussion about our paper when it was presented at the thirteenth annual Conference on Critical Thinking and Educational Reform at Sonoma State University, Rohnert Park, California, August 1-4, 1993.

<sup>3</sup> Our thanks to Jon Young, Director of University College at Fayetteville State University, for helpful comments on earlier versions of this paper.